8th. World Congress on Computational Mechanics (WCCM8)
5th European Congress on Computational Methods in Applied Sciences and Engineeering (ECCOMAS 2008)
June 30 –July 5, 2008
Venice, Italy

A DISCONTINUOUS GALERKIN FORMULATION OF KIRCHHOFF-LOVE SHELLS: FROM LINEAR ELASTICITY TO FINITE DEFORMATIONS

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Key Words: *Discontinuous Galerkin method, Kirchhoff-Love shells.*

ABSTRACT

Spatially-discontinuous Galerkin methods constitute a generalization of weak formulations, which allow for discontinuities of the problem unknowns in its domain interior [1]. When considering problems involving high-order derivatives, discontinuous Galerkin methods can also be seen as a means of enforcing higher-order continuity requirements in a weak manner [2,3].

Recently, the authors [4] have proposed a DG formulation for Kirchhoff-Love shell theory for which both the membrane and the bending response of the shell are considered. The proposed one-field formulation takes advantage of the weak enforcement in such a way that the displacements are the only discrete unknowns, while the C^1 continuity is enforced weakly. The consistency, stability and rate of convergence of the numerical method are demonstrated for the case of a linear elastic material.

In this work, this method is extended to shell problems involving finite displacements and finite deformations.

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